Claims

1. An air conditioning system for running a refrigeration cycle by circulating refrigerant through a refrigerant circuit provided with a heat-source side heat exchanger and a utilization side heat exchanger and supplying air having passed through the utilization side heat exchanger to a room to cope with latent heat load and sensible heat load in the room, wherein

the refrigerant circuit includes as the utilization side heat exchanger an adsorption heat exchanger provided with an adsorbent on the surface thereof, and

the refrigerant circuit alternately creates an adsorption action of allowing moisture in the air to adsorb on the adsorption heat exchanger and a regeneration action of allowing moisture to desorb from the adsorption heat exchanger.

2. The air conditioning system of claim 1, wherein

the refrigerant circuit includes, as a utilization side heat exchanger, an air heat exchanger for exchanging heat between air and refrigerant in addition to the adsorption heat exchanger and is configured to operates in a mode in which the air heat exchanger serves as an evaporator and the heat-source side heat exchanger serves as a condenser or a mode in which the air heat exchanger serves as a condenser and the heat source-side heat exchanger serves as an evaporator, and

the air conditioning system supplies the air having passed through the air heat exchanger to the room to cope with sensible heat load in the room.

3. The air conditioning system of claim 2, wherein

the refrigerant circuit is configured to repeatedly alternate between a mode in which the adsorption heat exchanger serves as an evaporator and a mode in which the adsorption heat exchanger serves as a condenser,

the refrigerant circuit dehumidifies air in the adsorption action by allowing moisture in the air to adsorb on the adsorption heat exchanger serving as an evaporator and humidifies air in the regeneration action by allowing moisture to desorb from the adsorption heat exchanger serving as a condenser, and

the air conditioning system supplies the air dehumidified or humidified by the adsorption heat exchanger to the room to cope with latent heat load in the room.

4. The air conditioning system of claim 2, wherein

the refrigerant circuit includes first and second adsorption heat exchangers and is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as an evaporator and the second adsorption heat exchanger serves as a condenser and a mode in which the first adsorption heat exchanger serves as a condenser and the second adsorption heat exchanger serves as an evaporator,

the refrigerant circuit dehumidifies air in the adsorption action by allowing moisture in the air to adsorb on the adsorption heat exchanger serving as an evaporator and humidifies air in the regeneration action by allowing moisture to desorb from the adsorption heat exchanger serving as a condenser, and

the air conditioning system supplies the air dehumidified or humidified by the adsorption heat exchanger to the room to cope with latent heat load in the room.

5. The air conditioning system of claim 2, wherein

the refrigerant circuit includes first and second adsorption heat exchangers and is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as an evaporator and the second adsorption heat exchanger is in non-operating condition and a mode in which the second adsorption heat exchanger serves as an evaporator and the first adsorption heat exchanger is in non-operating condition,

the refrigerant circuit dehumidifies air in the adsorption action by allowing

moisture in the air to adsorb on the adsorption heat exchanger serving as an evaporator and allows moisture to desorb from the adsorption heat exchanger in non-operating condition in the regeneration action by supplying air to the adsorption heat exchanger in non-operating condition, and

the air conditioning system supplies the air dehumidified by the adsorption heat exchanger serving as an evaporator or the air humidified by the adsorption heat exchanger in non-operating condition to the room to cope with latent heat load in the room.

6. The air conditioning system of claim 2, wherein

the refrigerant circuit includes first and second adsorption heat exchangers and is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as a condenser and the second adsorption heat exchanger is in non-operating condition and a mode in which the second adsorption heat exchanger serves as a condenser and the first adsorption heat exchanger is in non-operating condition,

the refrigerant circuit allows moisture in the air to adsorb on the adsorption heat exchanger in non-operating condition in the adsorption action and humidifies air in the regeneration action by allowing moisture to desorb from the adsorption heat exchanger serving as a condenser, and

the air conditioning system supplies the air dehumidified by the adsorption heat exchanger in non-operating condition or the air humidified by the adsorption heat exchanger serving as a condenser to the room to cope with latent heat load in the room.

7. The air conditioning system of claim 3, 4, 5 or 6, switchable between a dehumidification cooling operation for supplying air cooled by the air heat exchanger and air dehumidified by the adsorption heat exchanger to the room and a humidification heating operation for supplying air heated by the air heat exchanger and air humidified by the adsorption heat exchanger.

8. The air conditioning system of claim 1, wherein

the refrigerant circuit includes only first and second adsorption heat exchangers as said utilization side heat exchangers and is configured to run in an operation in which the first and second adsorption heat exchangers alternately serve as an evaporator while the heat-source side heat exchanger serves as a condenser or an operation in which the first and second adsorption heat exchangers alternately serve as a condenser while the heat-source side heat exchanger serves as an evaporator, and

the air conditioning system supplies air having passed through the adsorption heat exchanger serving as an evaporator or air having passed through the adsorption heat exchanger serving as a condenser to the room to cope with sensible heat load and latent heat load in the room.

9. The air conditioning system of claim 8, wherein

the refrigerant circuit is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as an evaporator and the second adsorption heat exchanger serves as a condenser and a mode in which the first adsorption heat exchanger serves as a condenser and the second adsorption heat exchanger serves as an evaporator, and

the refrigerant circuit dehumidifies air in the adsorption action by allowing moisture in the air to adsorb on the adsorption heat exchanger serving as an evaporator and humidifies air in the regeneration action by allowing moisture to desorb from the adsorption heat exchanger serving as a condenser.

10. The air conditioning system of claim 8, wherein

the refrigerant circuit is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as an evaporator and the second

adsorption heat exchanger is in non-operating condition and a mode in which the second adsorption heat exchanger serves as an evaporator and the first adsorption heat exchanger is in non-operating condition, and

the refrigerant circuit dehumidifies air in the adsorption action by allowing moisture in the air to adsorb on the adsorption heat exchanger serving as an evaporator and allows moisture to desorb from the adsorption heat exchanger in non-operating condition in the regeneration action by supplying air to the adsorption heat exchanger in non-operating condition.

11. The air conditioning system of claim 8, wherein

the refrigerant circuit is configured to repeatedly alternate between a mode in which the first adsorption heat exchanger serves as a condenser and the second adsorption heat exchanger is in non-operating condition and a mode in which the second adsorption heat exchanger serves as a condenser and the first adsorption heat exchanger is in non-operating condition, and

the refrigerant circuit allows moisture in the air to adsorb on the adsorption heat exchanger in non-operating condition in the adsorption action and humidifies air in the regeneration action by allowing moisture to desorb from the adsorption heat exchanger serving as a condenser.

12. The air conditioning system of claim 9, 10 or 11, switchable between a dehumidification cooling operation for supplying air having passed through the adsorption heat exchanger serving as an evaporator to the room and a humidification heating operation for supplying air having passed through the adsorption heat exchanger serving as a condenser.

13. The air conditioning system of claim 1, 2 or 8, wherein the refrigerant circuit is

operable in a mode in which the heat-source side heat exchanger and the adsorption heat exchanger concurrently serve as condensers and configured so that during the mode refrigerant flows into the adsorption heat exchanger serving as a condenser after passing through the heat-source side heat exchanger.

14. The air conditioning system of claim 2, wherein the refrigerant circuit is operable in a mode in which the air heat exchanger and the adsorption heat exchanger concurrently serve as condensers and configured so that during the mode refrigerant flows into the adsorption heat exchanger serving as a condenser after passing through the air heat exchanger serving as a condenser.

15. The air conditioning system of claim 1, 2 or 8, wherein the refrigerant circuit is operable in a mode in which the heat-source side heat exchanger and the adsorption heat exchanger concurrently serve as condensers and configured so that during the mode refrigerant flows into the heat-source side heat exchanger after passing through the adsorption heat exchanger serving as a condenser.

16. The air conditioning system of claim 2, wherein the refrigerant circuit is operable in a mode in which the air heat exchanger and the adsorption heat exchanger concurrently serve as condensers and configured so that during the mode refrigerant flows into the air heat exchanger serving as a condenser after passing through the adsorption heat exchanger serving as a condenser.

17. The air conditioning system of claim 1, 2 or 8, wherein the refrigerant circuit is operable in a mode in which the heat-source side heat exchanger and the adsorption heat exchanger concurrently serve as evaporators and configured so that during the mode refrigerant flows into the adsorption heat exchanger serving as an evaporator after passing

through the heat-source side heat exchanger.

18. The air conditioning system of claim 2, wherein the refrigerant circuit is operable in a mode in which the air heat exchanger and the adsorption heat exchanger concurrently serve as evaporators and configured so that during the mode refrigerant flows into the adsorption heat exchanger serving as an evaporator after passing through the air heat exchanger serving as an evaporator.

19. The air conditioning system of claim 1, 2 or 8, wherein the refrigerant circuit is operable in a mode in which the heat-source side heat exchanger and the adsorption heat exchanger concurrently serve as evaporators and configured so that during the mode refrigerant flows into the heat-source side heat exchanger after passing through the adsorption heat exchanger serving as an evaporator.

20. The air conditioning system of claim 2, wherein the refrigerant circuit is operable in a mode in which the air heat exchanger and the adsorption heat exchanger concurrently serve as evaporators and configured so that during the mode refrigerant flows into the air heat exchanger serving as an evaporator after passing through the adsorption heat exchanger serving as an evaporator.

21. The air conditioning system of claim 2, wherein

the refrigerant circuit includes first and second adsorption heat exchangers as the utilization side heat exchangers, and

the refrigerant circuit comprises a first circuit in which the heat-source side heat exchanger, a variable-opening expansion valve and the air heat exchanger are arranged in series and a second circuit in which the first adsorption heat exchanger, a variable-opening expansion valve and the second adsorption heat exchanger are arranged in series, the first

and second circuits being connected in parallel with each other.

22. The air conditioning system of claim 3, 4 or 5, wherein the refrigerant circuit is configured so that the refrigerant evaporation temperature in one of the heat-source side heat exchanger and the air heat exchanger which serves as an evaporator and the refrigerant evaporation temperature in the adsorption heat exchanger serving as an evaporator can be set to have different values.

23. The air conditioning system of claim 3, 4 or 6, wherein the refrigerant circuit is configured so that the refrigerant condensation temperature in one of the heat-source side heat exchanger and the air heat exchanger which serves as a condenser and the refrigerant condensation temperature in the adsorption heat exchanger serving as a condenser can be set to have different values.

24. The air conditioning system of claim 1, wherein

the air conditioning system includes a heat exchange element for exchanging heat between a first air and a second air, and

at least one of the first and second airs is air for adsorption or air for regeneration before passing through the adsorption heat exchanger.

25. The air conditioning system of claim 1, wherein the flow passage for air for adsorption or air for regeneration passing through the adsorption heat exchanger is provided with a latent heat handling element for coping with latent heat in the air.